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TROPICAL DISEASES BULLETIN

Vol. 6. 1915. No. 2.

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TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 6.] 1915. [No. 2.

MALARIA.

STOTT (H.). **Studies in Malaria.**—*Indian Med. Gaz.* 1914. Dec. Vol. 49. No. 12. pp. 462–471. With 7 charts, 2 plans & 12 photos; 1915. Jan. Vol. 50. No. 1. pp. 7–10. With 7 charts; Feb. No. 2. pp. 47–52. With 14 charts; Mar. No. 3. pp. 85–91. With 1 plate; Apr. No. 4. pp. 131–135. With 2 plates & 1 fig.; May. No. 5. pp. 172–175; June. No. 6. pp. 213–217. With 6 charts.

This lengthy and elaborate paper runs through no less than seven numbers of the *Indian Medical Gazette*, is very well illustrated so far as photographs are concerned and is furnished with plans, diagrams and records of temperature charts. It must be read in the original if its full value is to be obtained, but certain of the observations and conclusions may be noted here. The author deals with malaria at Fort Dufferin, Mandalay, as it affected five distinct population groups living within the walls, and explains why the admission rates amongst these groups varied from 68 per cent. to 1 per cent.

A brief review of the past history of malaria in Mandalay shows that there were recurring epidemic periods at somewhat regular ten-yearly intervals, and that while the curves for British and Indian troops follow a very similar general outline, the former suffered most during epidemics and the latter maintained their degree of infection to some extent throughout non-epidemic years. Stott considers the possible causes of these conditions, but is unable to advance any very definite opinion.

Turning to the epidemic under consideration, that of 1911–12, the five population groups consisted of the 91st Punjabis, the 92nd Punjabis, Jail Prisoners, Jail Warders and Europeans, all collected together in an area of $1\frac{1}{4}$ square miles [see Plan I] and exposed to the same climatic and other external influences, yet presenting the greatest diversity as regards their rates of fever admissions, as is evident from the subjoined tables.

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TABLE I.—1911.

Group.	Description.	Average monthly strength.	Total annual fever admissions.	Per cent.
I.	92nd Punjabis	681	127	18·6
II.	91st ,,	777	459	59·0
III.	Jail Prisoners	969	14	1·4
IV.	Jail Warders	50	31	62·0
V.	Europeans	58	16	27·5
	Troops* outside Fort	621	194	31·2

*British, Burmese Sappers, Indian Mule Corps.

TABLE II.—1912.

Group.	Description.	Average monthly strength.	Total annual fever admissions.	Per cent.
I.	92nd Punjabis	675	187	27·7
II.	91st ,,	654	451	68·9
III.	Jail Prisoners	1,085	15	1·3
IV.	Jail Warders	60	18	30·0
V.	Europeans	40	9	22·5
	Troops outside Fort	543	147	27·0

TABLE III.—1913.

Group.	Description.	Average monthly strength.	Total annual fever admissions.	Per cent.
I.	92nd Punjabis	702	49	6·9
II.	91st ,,	645	136	21·0
III.	Jail Prisoners	974	28	2·8
IV.	Jail Warders	50	8	16·0
V.	Europeans	..	..	..
	Troops outside Fort	462	143	30·9

The author suggests three explanations of these figures :—

(i). The various groups might not be equally exposed to attacks of anophelines.

(ii). Their antimalarial immunity might vary.

(iii). They might be differently protected by the antimalarial measures adopted.

In discussing these he considers the physical and meteorological conditions of Mandalay, pointing out that not only is it a very favourable spot for the evolution of mosquito life, but that the mean temperature for each day of the year is practically that which is said to be most favourable for the life cycle of the malarial parasite in anophelines. The mosquito breeding places are described and very well illustrated. In July *M. culicifacies* and *N. rossii* were the chief breeders. [Stott speaks of the latter as harmless ,but the recent work of WALKER and BARBER in the Philippines [see this *Bulletin*, Vol. 5, p. 337] goes to show that this is not quite the case, at least in the area where they worked.] In December *N. fuliginosus*, *M. sinensis* and *M. barbirostris* only were found. Although it is not possible to summarise all the information supplied, the author's deductions may be quoted. He says :—

" 1. It is evident from the foregoing epidemiological account, that the physical, geological, and meteorological features of Mandalay are very favourable the whole year round to the development of mosquito life, provided that suitable breeding spots are available.

" 2. We have seen that in Fort Dufferin such breeding spots are omnipresent, both in the moat which surrounds it and in the channels which traverse it. In addition there exist the surface waterpools after the rains and also those collections of water associated with the every-day life of the population.

" 3. It is clear that these breeding places are taken full advantage of by the malaria carrying anophelines and that their larvae may be caught throughout the year (March and April), and that no area within the Fort can be considered out of range of flight of the adults."

He therefore thinks that there is no epidemiological explanation for the variation in the malarial admission rates. His argument can be better followed by a study of the plan.

As regards possible acquired or natural immunity, at all times a difficult question, Stott thinks that while it may have played some part a more important factor must be looked for than the mere susceptibility to infection of the groups concerned.

He considers in detail the measures adopted by the different groups, and it is interesting to note that, in the case of the jail prisoners, a wall 16 feet in height apparently wholly prevented mosquito invasion from without. He considers the following deductions justifiable :—

" 1. Within a definitely confined area of one and a quarter miles square, the total abolition of mosquito breeding grounds in one small area and the prevention of mosquito immigration thereto, entirely protected one population group (the prisoners) from fresh malarial infection.

" 2. Amongst the two groups (91st Punjabis and jail warders) who relied during 1911 on supervised prophylactic quinine, considerably over half (60 per cent.) were admitted with malarial fever.

" 3. Whilst another group (92nd Punjabis) which took supervised prophylactic quinine, but in addition thereto relied on a supervised system of mosquito net prophylaxis, reduced this admission rate by over two-thirds to 18 per cent.

" 4. Anti-larval measures against the responsible breeding grounds in the Fort caused a reduction of the 92nd Punjabis rate in 1913 to 7 per cent. and that of the jail warders to 16 per cent. Along with these measures the adoption of a supervised system of mosquito net prophylaxis in the 91st Punjabis reduced their rate by nearly two-thirds to 21 per cent.

"5. The admission rate amongst the troops and followers outside the Fort, amongst whom no special campaign was conducted, remained approximately constant for the three years at 30 per cent. per annum.

"6. Amongst the European population attempts at personal prophylaxis were so irregular as to render them from the collective standpoint worthless. The following important conclusions may be deduced from these figures of three years antimalarial prophylaxis in Mandalay—namely, that the abolition of mosquito breeding grounds with a prevention of mosquito immigration, or prophylaxis by mosquito nets and anti-larval measures proved a far better mode of preventing malarial fever than the exhibition of a carefully supervised issue of prophylactic quinine."

Part II of the paper is concerned with the experiment which was made to test the value of quinine prophylaxis, the salt employed being the sulphate given in acid solution and in 15 grain doses every Sunday, Tuesday and Thursday to the odd halves of Companies of the 91st Punjabis, the even halves being taken as controls. The men of this regiment were not using mosquito nets like those of the 92nd Punjabis and despite the quinine prophylaxis their admission rate rose after an initial fall and was at all times higher than that of the 92nd.

The original paper must be consulted for the details of the experiment, but it may be said that it was very thorough, even to the extent of testing the stock quinine mixture with the hydrometer to ensure that it possessed the proper strength of salt. As criteria for judging the results Stott relied upon (1) the fever admission rate and (2) the degree of severity of the attack.

The latter was estimated :—

"(i). *By the total number of days each patient remained sick in Hospital.*

"(ii). *By the intensity of the actual febrile disturbance,* as measured by the sum of the number of degrees above 99° F., which were recorded at each reading of the patient's temperature taken four times in the 24 hours (8 a.m., noon, 4 and 8 p.m.).

"(iii). *By the number of grains of quinine required* before the pyrexia fell to normal and remained thereat until the patient's discharge.

"(iv). *By the tendency to relapse.*"

The results under each of these headings receive careful consideration and the author concludes that :—

"After a careful consideration of the results obtained from this year's trial of supervised and controlled prophylactic quinine in the 91st Punjabis, and after due consideration has been given to the cost of the issue,* the trouble to the medical and military authorities and the dislike of the sepoys to it, I hold that no case has been made out in the circumstances of this experiment for the use of prophylactic quinine in the prevention of a malarial attack, or in a diminution of its severity should an attack arise.

"If prophylactic quinine failed when its issue was as carefully administered as is ordinarily possible in a regiment, can it be expected to succeed when distributed broadcast amongst an undisciplined rural population ?

"No definite scientific result can be claimed as a result of this trial, for every detail could not be supervised with the necessary essential accuracy. On the other hand, a definite enquiry by special malariologists appointed to examine the controlled effect of prophylactic quinine in a regiment free from infection and posted to a malarious district, would seem to be more than ever an urgent necessity."

[It is instructive to compare this view with that taken recently by Barlow in Honduras. [See this *Bulletin*, Vol. 5, p. 345.]

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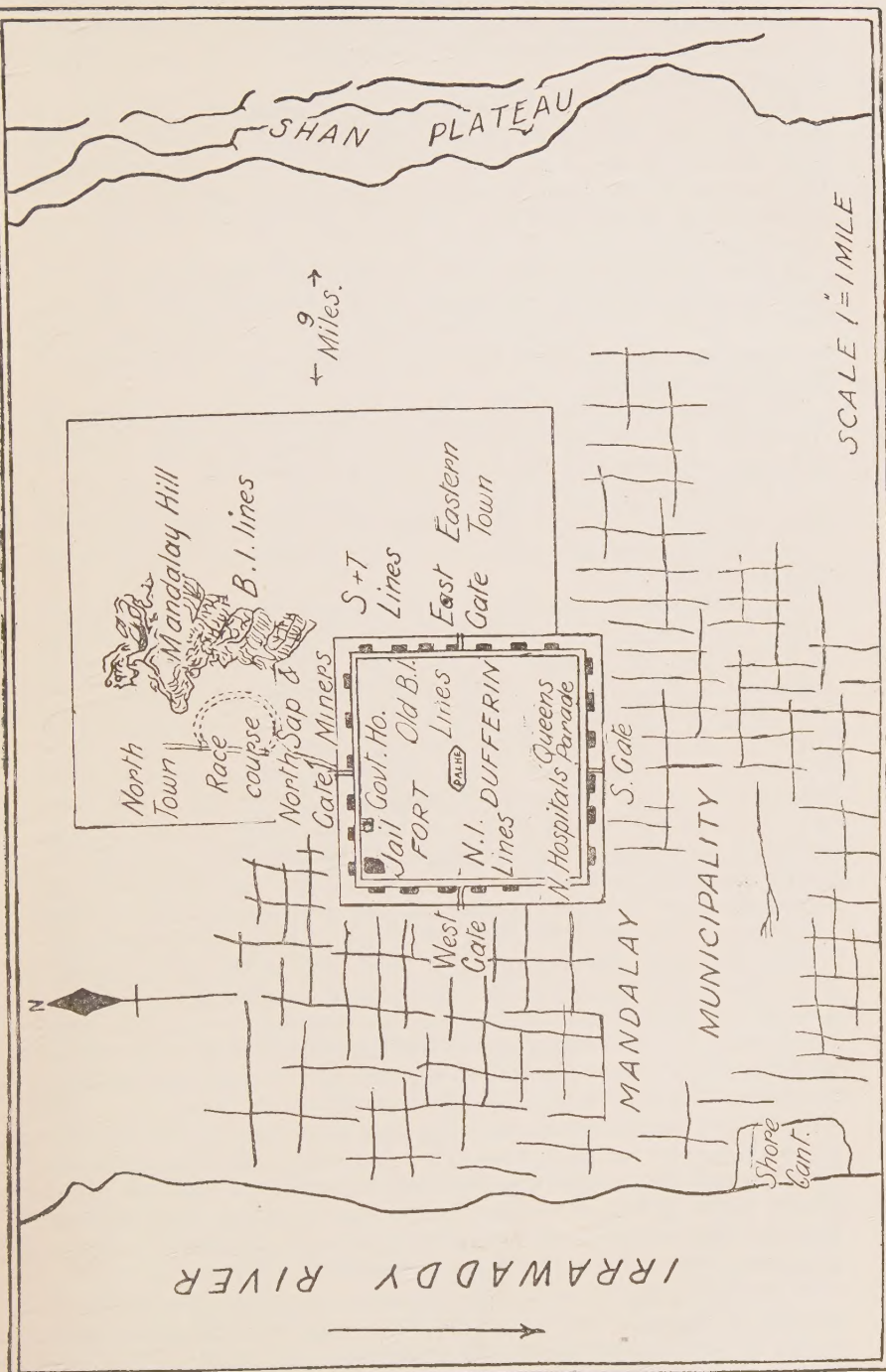
* The annual cost of giving prophylactic quinine for 9 months out of a year in ten grain doses twice weekly to a regiment with an average monthly present strength of 650 men is Rs. $\frac{650 \times 20 \times 52 \times 9 \times 10}{12 \times 7{,}000} =$ Rs. 725.



Plan of Mandalay Cantonment, showing its relation to the Municipality.

Part III is devoted to certain clinical observations, the author insisting that the first practical line of diagnosis depends on clinical observations and, while not underrating the value of blood examination in malaria, apparently relegating it to a secondary or at least a supplementary position.

He presents a very interesting study of temperature charts, some of which are here reproduced as likely to be useful, for records of this type are not always to be found in the text books. His analysis of the various groups deserves careful study but is too extensive and minute to be summarised here. Only 5 per cent. of his cases were classed as remittents.

A portion of the paper deals with the pernicious symptoms observed and examples are given of hyperpyrexial, comatose, delirious, convulsive, paretic, dysenteric, haemorrhagic and syncopal types. The haemorrhagic case, in which there was epistaxis and blood passed from the rectum, recovered.

The remainder is concerned with blood observations, chiefly in connection with the differential leucocyte count and with notes on technique, staining and defects met with in blood fiims.

It is interesting to note the results obtained in the examination of films from 25 healthy adult Indian males, who were as nearly as possible of the same race and individual types as the malarial patients examined (163 in number).

The latter showed an average large mononuclear count of 21·6 per cent. In the former the count varied from 5 per cent. to 16 per cent. In 92 per cent. the average was under 15. The tables given must be consulted in the original. Stott thinks the large mononuclear count with other differentials can only be of practical value in diagnosis when the blood counter and his personal equation are known. There is nothing of special note in the chapter on technique and blood examination, while the rough drawings are of little value, but there is a table on the differentiation of malarial parasites which merits attention, as it endeavours to point out the differences between the young ring stages of the three species in addition to dealing with the large forms and the gametocytes. It may be compared with a table in the second Report of the Wellcome Tropical Research Laboratories.

In yet another instalment of his paper the indefatigable Captain Stott discusses oral quinine as a temporary curative agent and as a preventive of relapses. Under the first heading he analyses 1,019 cases under his care with a view to finding out the amount of quinine that was required to reduce the temperature to normal and maintain it thereat until discharge. Excluding 190 cases which recovered without any quinine at all, he finds that the remaining 829 required on an average 6·5 ten-grain doses of the fluid drug to fulfil these requirements. This means two days' quinine treatment at the rate of ten grains thrice daily. It seems that a case suffering from repeated malarial admissions needs on an average more quinine to effect a temporary cure in his earlier than his later bouts of fever.

Stott thinks that there are still occasions when the quinine test is helpful in diagnosis, but he is perfectly certain that the axiom enunciated by Sir Leonard Rogers [recently also supported by Bates of Panama, see this number] cannot be relied on. It is to the effect that "any fever which lasts longer than the time limits stated

(4 to 6 days) under proper dose of quinine is not malaria or at least is not purely malarial in nature. It is, however, essential to know that the drug is really being taken in adequate doses and in an assimilable form."

The author agrees with MANSON that the quinine test will sometimes fail and he gives details of an interesting clinical case [the temperature chart mentioned is not reproduced] which certainly seems to bear out this contention.

As regards the power of quinine to prevent relapses Stott's results are somewhat vitiated, as he himself mentions, by the lack of proper controls but he presents some evidence to show that a careful four months' treatment with quinine failed in great measure to prevent relapses. Some of the apparent relapses may, however, have been fresh infections.

One cannot help thinking that the last contribution of Stott to his Studies in Malaria is the most sensible and satisfactory of the numerous papers which have recently appeared on the vexed question of intramuscular injections of quinine in malaria.

He considers first the risk of tetanus, which he regards as negligible and as being merely an incentive to greater care in technique.

The question of local precipitation of the salt at the site of injection next engages his attention, and he points out that quinine experiments with small animals should be received with extreme caution, for the great majority of these animals are herbivorous, their blood serum is more alkaline and hence the local reaction consequent on the injection of an irritating acid solution is greater than in carnivorous man [While this argument holds good for Europeans it cannot be advanced in the case of many vegetarian natives, and it would be interesting if statistics were forthcoming as to the relative frequency of post-injection trouble in these two classes.]

Further the question of dose per body weight has to be carefully considered. Stott's remarks may be quoted. He says :—

"The amount of quinine given these small animals per gramme body weight would seem to be enormous. Semple found that 1 grain per 150 grammes of guinea-pig was an approximate minimum lethal hypodermic dose for this animal, and that the dose of an injection sufficient to produce well-marked visible effects without killing the animal was 1 grain per 350 grammes of guinea-pig. The former corresponds to a hypodermic injection of 420 grains of quinine for a man of 10 stone weight, and the latter to an injection of somewhat under 200 grains. No wonder local effects after these guinea-pig experiments were in all cases evident."

Like most other observers he is of opinion that faulty technique has a great deal to do with the formation of indurated lumps and also with the occurrence of sepsis and other troubles which have been reported from time to time.

He proceeds to advance clinical evidence taken from his 1,019 cases of malaria as to the value of the intramuscular method and furnishes some useful illustrative charts. He believes that when the method fails the failure is sometimes due to the injection being too long delayed, but admits that there are rare cases where the injection unaccountably fails. It is, he believes, of special value in cases of persistent relapse. It is worth noting that he does not think more than ten grains should ever be injected into one spot and that more than seven is undesirable. He uses the bihydrochloride.

A. Balfour.

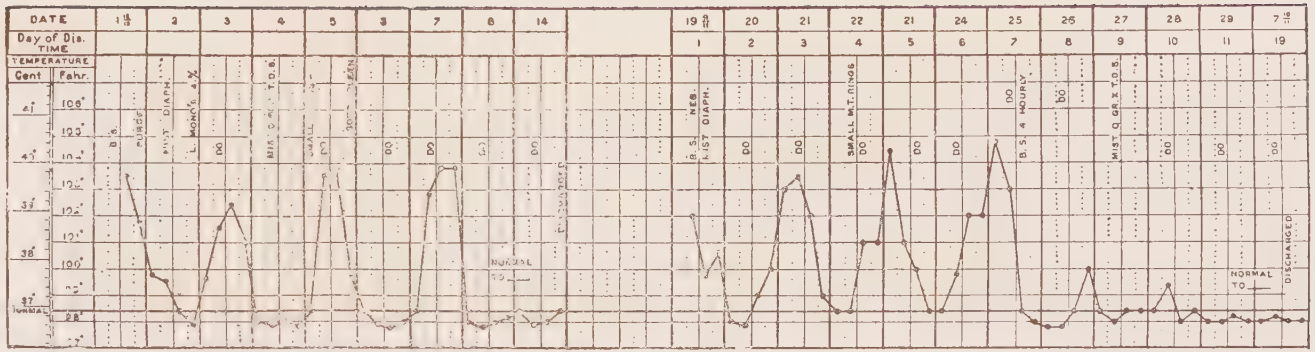


Chart VI. Atypical M.T. paroxysms, attacks shortened simulating B.T. infection. Many small rings with double chromatin dots and many écolé forms were found on 5-12-12. The reverse process (lengthened B.T. paroxysms) may occur, thus providing a fallacy in clinical diagnosis of atypical charts. Sep. B.S., No. 2,414, 92nd P. Service 2 yrs.

Chart VII. Atypical M.T. paroxysms, showing absence of sudden unbroken high initial rise (parox. 3 and 4). Sep. B.S., No. 2,141, 92nd P. Aet. 23, service 4 yrs.

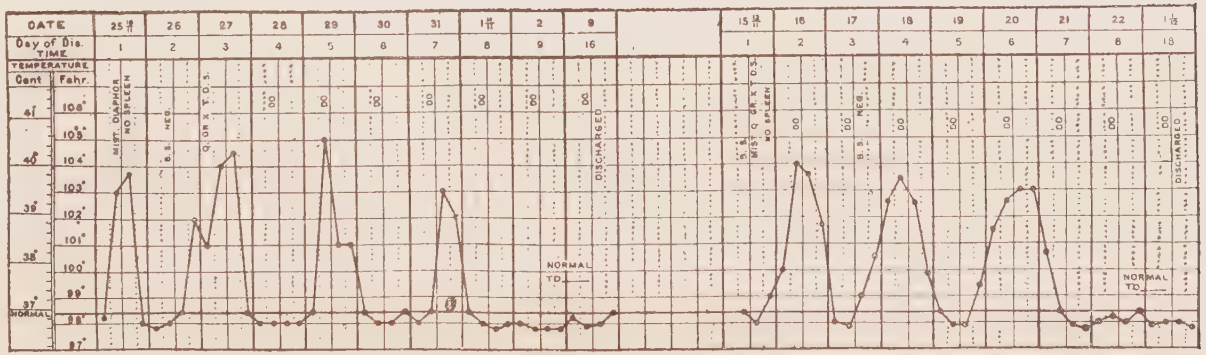


Chart VIII. Atypical M.T. paroxysms, showing absence of pre-critical elevation in a dying infection (parox. 3). L. N.R. S., No. 1,777, 91st P. Aet. 34, service 15 yrs.

Chart IX. Atypical M.T. paroxysms, showing absence of typical depression at summit of attack. Sep. S.K., No. 2,454, 91st P. Aet. 31, service 7 yrs.

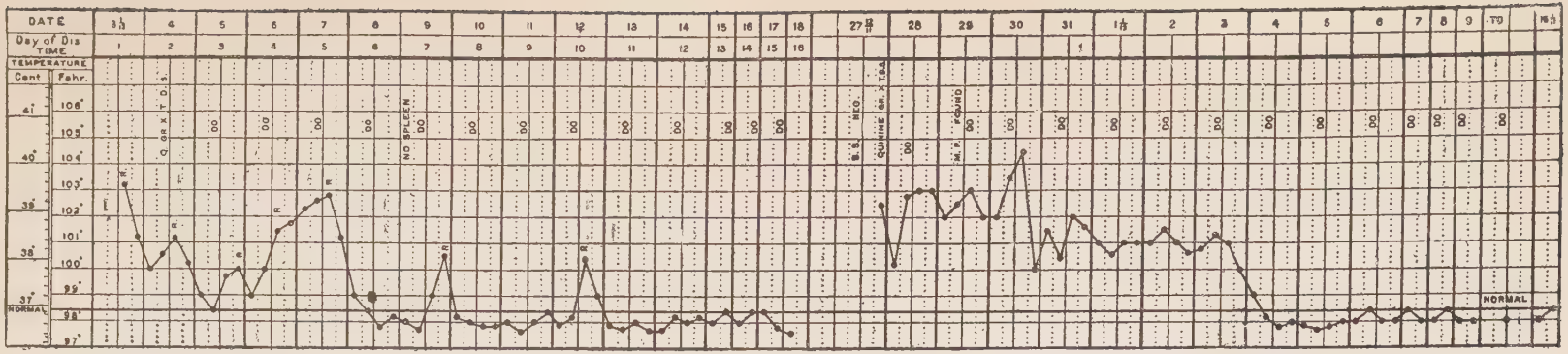


CHART X. A curve in irregular malarial infection. Sep. M.R., No. 2,838, 91st P. Aet. 20, service 2 yrs.

CHART XI. A curve in the continuous remittent fever of malarial infection. Sep. C.S., No. 1,579, 91st P.

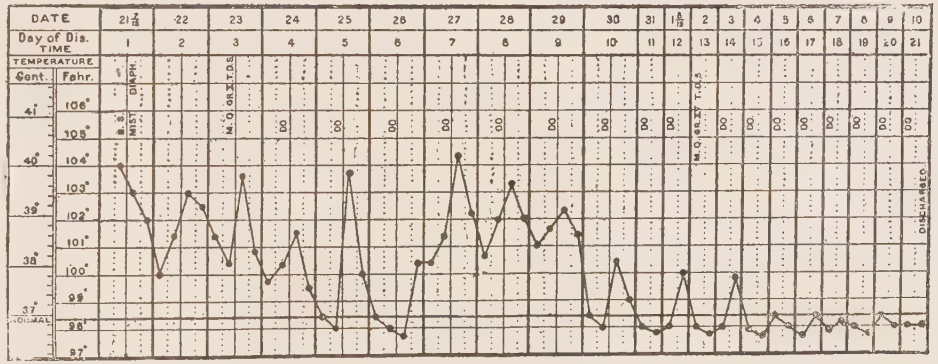


CHART XII. A curve in the subintrant remittent fever of malarial infection. Sep. K.S., No. 2,714, 91st P. Aet. 22, service 4 yrs.

CHARTS SHOWING TYPES OF MALARIAL INFECTIONS.

ALGÉRIE. **Campagne Antipaludique de 1913.**—132 pp. With 2 maps, 1 plate, 6 charts and 11 figs. Republique française. Gouvernement Général de l'Algérie. 1914. Alger: Typographie Adolphe Jourdan, Place du Gouvernement.

This report shows that the anti-malaria campaign in Algeria proceeds apace. The two methods chiefly employed are measures against mosquitos and systematic quininisation. especially in the case of schools. The greater portion consists of sanitary records submitted by the medical officers of the districts comprising the departments of Constantine, Algiers, Oran and the Southern Territory.

The campaign, as it affects the different railway systems, receives separate treatment, and Drs. Edmond and Etienne SERGENT contribute some notes on the epidemiological aspects of malaria in Algeria. The paper on a case of pernicious malaria in which red-ringed red cells were found [see this *Bulletin*, Vol. 3, p. 50] is republished here, and the plate reproduced.

The individual reports scarcely call for special mention, though the occurrence of four cases of blackwater at Batna may be noted. Dr. MONDELIN, under whose care they were, states that one of them had never suffered from malaria. [Can cryptic malaria be excluded ?] His treatment consisted chiefly in injections of artificial serum and caffeine. Three of the cases recovered. The one which terminated fatally had been treated at the outset by quinine injections.

The results of the anti-malarial measures are generally satisfactory. Quininisation is the method most easily applicable throughout Algeria, but anti-mosquito measures on a small scale have given excellent results in numerous localities. Mechanical protection against mosquitos remains a measure *de luxe* for the use of government officials and the railway staffs.

There is a good deal of useful information scattered throughout this report.

A. B.

SERGENT (Edmond & Etienne). **Etudes epidémiologiques et prophylactiques du Paludisme. Onzième et douzième campagnes en Algérie en 1912 et 1913.**—*Malariologia* (*Propaganda Antimalarica*). 1915, Apr. 15. Vol. 8. No. 1–2. pp. 1–8. *Ann. Inst. Pasteur.* 1915. May. Vol. 29. No. 5. pp. 249–257.

This paper is to all intents and purposes identical with the supplement published by these authors in the Report on the Anti-malarial Campaign in Algeria during 1913 [see above.]

Some information is given regarding the breeding places of *Pyretophorus myzomyifacies*, *Anopheles maculipennis* and *Pyretophorus chaudoyei*, while the occurrence of blackwater fever at Palikao in the district of Oran as well as at Batna [see review of Algerian Report] is recorded. There is also a note to the effect that the trains traversing the marshes of Mocha in the district of Oran, or which run along the borders of the lake of Fetzara (Région de Bône), are boarded at sunset and at daybreak by swarms of anophelines which may be carried considerable distances.

A. B.

i. CLELAND (J. B.). **Malaria in New South Wales. An Official Note from the Government Bureau of Microbiology.**—*Med. Jl. of Australia.* 1915. Apr. Vol. 1. 2nd Year. No. 14. pp. 316–317.

ii. JAMIESON (Sydney). **Malaria in New South Wales.** (Correspondence). —*Ibid.* No. 15. pp. 346–347.

i. Cleland of the Government Bureau of Microbiology, New South Wales, commenting on the case of indigenous malarial infection recently recorded by JAMIESON [this *Bulletin*, Vol. 5, p. 342], discusses the prevalence of anophelines in New South Wales and Australia generally and deals with the risks of local infection.

His observations, together with those of FERGUSON, show that *Nyssorhynchus annulipes*, the presumed transmitter of malaria in Australia, is widely but sparsely distributed in New South Wales. It has been occasionally found in the Sydney district and even in the city suburbs, its larvae having been obtained in pools of clear, fresh water, but it is not at all common. As it has also been taken in the neighbourhood of Adelaide and Perth it would seem that it occurs throughout the Southern States, but in such small numbers as not to constitute a danger.

The only place where it is at all numerous is a spot on the River Murray in South Australia, but here there is practically no population. At the same time a mosquito survey of this river and its tributaries, such as the Darling, is required so that where an abundance of this anopheline is found malaria carriers may be excluded or properly protected.

Although a study of old records shows that malaria may have existed in certain parts of New South Wales, there is no definite proof that it did so and under present conditions there seems little likelihood of the disease spreading in this State.

ii. Dr. Jamieson replies to the above paper in a distinctly bellicose strain, being evidently under the impression that an attempt was being made to belittle the importance of his observation and warning. He considers CLELAND'S statements in detail, cites the historical example of Mauritius and states that though cases of malaria not infrequently find their way into the Sydney hospitals they almost invariably belong to the seafaring class and do not settle afterwards on shore but return to their maritime life. On the other hand soldiers returning infected from New Guinea and the Solomon islands resume their former occupations to the danger of the community, thus creating a state of things hitherto unknown in New South Wales.

He reiterates his warning and calls upon the health authorities to take the steps necessary for dealing with the mosquito problem as he considers, from CLELAND'S statements, that the research which has been conducted is not of a sufficiently exhaustive nature.

A. B.

BATES (John Pelham). **A Review of a Clinical Study of Malaria Fever in Panama.**—*Proc. Med. Assoc. Isthmian Canal Zone.* Oct. 1912 to Mar. 1913. Vol. 5. Pt. 2. pp. 115–136. With 3 charts.

This is an interesting paper but rather confused. Most of it could

have been compressed into much smaller compass. The conclusions which the author has reached as a result of his studies are :—

1. Malaria is a simple entity.
2. In the majority of cases it is readily amenable to treatment.
3. When it is efficiently treated the paroxysms can be controlled in from three to four days.
4. Primary infections and cases in children may prove a little stubborn but will yield on the fifth or sixth day after treatment is begun.
5. The occasional cases not affected by quinine will rapidly die.

At the outset Bates explains the method he followed in his work. It appears to have been very thorough and complete and led him to the belief that there are no long or lingering malarial fevers, nor any which may even be termed continuant.

On the other hand, there are no diseases in malarial countries which may not be complicated by malaria and there are no malaria infections which may not have some underlying disease, either patent or cryptic, to complicate their course. Hence the difficulties in diagnosis. For comparative purposes an abundance of material is essential and laboratory facilities are a *sine quâ non.* The author was fortunate in having both.

He reviews the standard text book teachings and finds that, with the exception of Marchiava and Bignami, Osler to some extent, and perhaps Manson, all the authorities regard malaria as a somewhat variable entity and protean in its manifestations. They state that it usually yields promptly to quinine but may be extremely resistant and drag on for weeks. In the course of such cases pernicious symptoms may develop and lead to death

These were Bates's views when he went to Panama. He quickly had evidence of the severity of malaria infection but even the worst of those which recovered did not run courses like those indicated by the authors quoted.

When the author began to look more closely into the question and work out the cases with negative findings as regards parasites in the peripheral blood he soon found that the indefinite fevers of two weeks duration or so were really cases of mild typhoid. In this connection he points out that to get satisfactory bacteriological results it is necessary to make the blood cultures within 24 to 36 hours after admission, for it must be remembered that patients with this class of fever delay coming to hospital for from two to ten days.

One case of indefinite fever turned out to be due to *Histoplasma capsulatum.* Continuing his argument Bates reviews recent work on the question of the course or duration of malaria under treatment, a subject which has not received much attention. He quotes Rogers, Deaderick, Craig, and Chalmers and Castellani. All, save the last named, agree that malaria is a short fever and, if properly treated, is easily controlled by quinine. Chalmers and Castellani on the other hand record cases of sub-tertian infection in which "*the fever has remained unaffected while the parasites can be found in the peripheral blood notwithstanding several weeks' quinine therapy by various methods.*" As this statement is not to be interpreted in the light of too small dosage having been employed Bates states that he cannot explain it and would like the authors to do so.

Bates does not believe in varieties of parasites inherently resistent to quinine, nor in the production of quinine-fast strains, nor in the condition of the patient preventing quinine acting efficiently, nor in the virulence of malaria parasites differing in different tropical countries.

He states that in his opinion the apparently prolonged malarial fevers are fevers due to uncinarial anaemia, kala-azar or typhoid either complicating the malaria or being wrongly diagnosed as malaria, and he lays great stress on the fact that malaria has no analogue in any other infectious disease.

He passes on to a consideration of atypical or mild typhoid in the tropics. His remarks on this subject need not detain us but the chart here reproduced is useful and interesting.

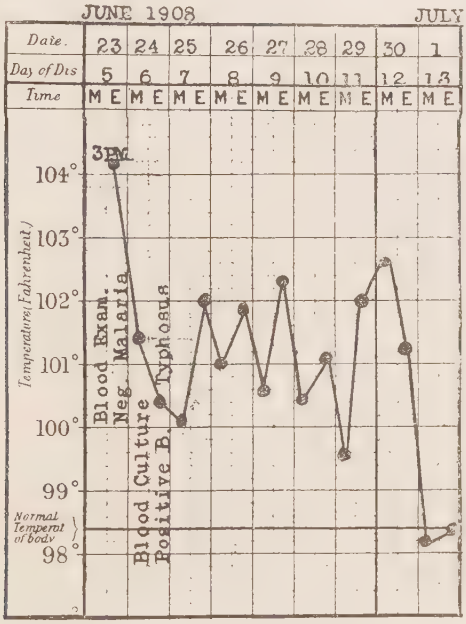


CHART. Typhoid fever with a temperature curve markedly similar to malaria fever. Cultures from blood positive *B. typhosus.* No malarial parasites found in the blood of the periphery.

In a discussion on the paper ROYER mentioned the continued fevers due to abdominal syphilis while DEEKS controverted the author's views. He finds that malaria, especially in a primary attack, does not always yield to heroic doses of quinine even in four days. Further, he objected to the expression malaria complicating typhoid fever. He considers that the diseases run hand in hand and he drew attention to the importance of paratyphoid infection and stated his belief in the occurrence of a true malarial dysentery.

[Whatever opinion may be held about some of BATES's views those with African experience will assuredly add trypanosomiasis to his three continued fevers and many will also doubtless remember cases of liver abscess and miliary tuberculosis which clinically were not at all easy to distinguish from malaria.

In reality Bates's paper is largely a plea for the early and efficient treatment of malaria, for he would appear to admit that if malaria is not treated at least fairly adequately it may drag on as a febrile disease for days and weeks. A treated malaria is not a normal malaria. Therefore, throughout, the author is dealing with the disease under abnormal conditions and it is difficult to see why he should have delivered such a lengthy discourse on the subject.] A. B.

STRINE (H. F.). **Malarial Infection complicating Splenectomy.**—*U. S. Naval Med. Bull.* 1914. Oct. Vol. 8. No. 4. pp. 655–656.

The patient, who had suffered from malaria and had been treated by quinine, received a blow over the splenic region in a boxing match, which ruptured the spleen and necessitated splenectomy. The organ was found to be about three times its normal size.

Thirty-six hours after the operation his temperature rose to 104° and he was extremely anaemic and semiconscious. His blood contained numerous segmenting and ring forms of the malarial parasite but no crescents were observed. [The author evidently implies that a sub-tertian infection was present. If so, the presence of mature schizonts is interesting.]

Quinine hydrochlorate (gr. 35) and later neosalvarsan (gm. 0·6) were given. Twenty-four hours thereafter an enormous number of crescents was found in the peripheral blood, other stages being absent.

The patient's general condition improved. The quinine was discontinued after the first week and a second injection of neosalvarsan was given during the second week. Despite this treatment the crescents persisted, until 30 days after the operation 10 grains of quinine hydrochlorate were given and this dosage continued daily. Then they gradually diminished and disappeared on the fifty-fourth day.

Strine comments upon the case, pointing out that convalescence was apparently uninfluenced by splenectomy and that the differential leucocyte count remained practically normal throughout. He asks why there was a sudden outpouring of crescents on the third day. Did the ruptured spleen liberate them? If so they could not have been missed when the blood was examined on the second day. Were they drawn into the circulation from the bone marrow or elsewhere by the rapid cellular extrusion following severe loss of blood and splenectomy and after the shock and reaction had passed away?

He also asks why they disappeared. Did the quinine destroy them or were they still lodging in the bone marrow? He invites suggestions.

In a final note he says that the patient remained well for six months, when he again contracted a malarial infection. No crescents were found. [It is said that tertian malarial organisms were present. Does this mean benign or sub-tertian? If the latter it is quite possible the condition was a relapse.] A. B.

CARTER (H. R.). **Report of a Case of Cerebral Malaria complicated by Ileus.**—*Proc. Med. Assoc. Isthmian Canal Zone.* Oct. 1912 to Mar. 1913. Vol. 5. Pt. 2. pp. 93–96.

Carter records a severe case of pernicious malaria in an adult male East Indian where the clinical picture was complicated by volvulus.

The paper must be consulted for details, which are carefully given. It is sufficient to note that quinine given at first intravenously and also subcutaneously in large dilution and then by the mouth cured the malaria and that large doses of morphine quickly relieved the intestinal condition.

A. B.

NELIGAN (A. R.). **Quinine Injections.** (Correspondence.)—*Jl. Trop. Med. & Hyg.* 1915. May 15. Vol. 18. No. 10. pp. 119–120.

A somewhat belated article from Persia on the vexed question of quinine injections. Neligan reviews previous correspondence and papers on the subject, gives an account of his clinical experiences in Teheran and states that, as a result, he has come to the conclusion that, when given in the right way, intramuscular injections of quinine are efficacious, quickly efficacious, and harmless. He does not think a case has yet been made out for their routine use, although he is prepared to admit that a course of quinine may very well begin with two injections of large doses. He reserves the method for cases complicated by severe indigestion, vomiting, diarrhoea, dysentery or coma, and as soon as possible starts oral administration. He uses the bihydrochloride and generally makes up his own solution which is a dilute one: 2 gm. of the salt in 10 cc. of filtered water. The solution is thrice brought to the boiling point and the injection made into the dorsal vertebral muscles, the glutei or the abductors on the outside of the thigh while the solution is still warm. A 10 cc. syringe is used and care is taken to wash off any quinine solution on the outside of the needle.

A. B.

REEVES (I. S. K.). **Malaria on U.S.S. "Tacoma" from February, 1913, to February, 1914.**—*U. S. Naval Med. Bull.* 1914. Apr. Vol. 8. No. 2. pp. 344–345.

A brief account of a small outbreak of malaria on board a United States war vessel which had been lying off Tampico in Mexico.

In severe cases or in those with gastro intestinal symptoms excellent results followed the intramuscular injection of chlorhydrosulphate of quinine. The pectoral muscle was found to be the most convenient site for injection.

A. B.

BRODRIBB (C.). **Intravenous Injection of Quinine.** (Correspondence.) *Indian Med. Gaz.* 1915. Jan. Vol. 50. No. 1. p. 33.

The author, writing from Secunderabad, gives an account of a case of malaria in which intravenous injection of quinine proved fatal. The patient was a European female, aged 34, fat and with alcoholic tendencies, who was admitted to hospital on September 20th, 1914, with a history of two days' fever, severe headache and slight cough. The throat was congested and there was an urticarial rash all over the face and body. The heart and lungs were normal and there was no enlargement of liver or spleen. The temperature was 100·8°, pulse 100 and respiration 22.

Calomel, aspirin and a diaphoretic mixture were administered and in the evening the patient was better. Blood examination showed many malignant tertian rings but no crescents. On the following day the patient had still further improved and was given quinine sulphate, 10 grains in solution thrice daily. The urine contained neither albumin nor sugar. In the evening the patient was not so well and next morning the temperature ran up to 106° F. with rapid pulse and increased respirations. As after sponging and the exhibition of aspirin there was still severe headache and restlessness, and as cerebral symptoms or hyperpyrexia might have ensued, recourse was had to an intravenous injection of quinine bihydrochloride in one pint of saline. This was well borne at the time, but about an hour later a dangerous collapse occurred, evidenced by profuse perspiration, rapid and low tension pulse, restlessness, dyspnoea and cyanosis. There was no pulmonary oedema but despite the use of adrenalin, stimulation and the administration of oxygen, which caused temporary improvement, the patient eventually became unconscious and died about 4½ hours after the injection. An autopsy was not permitted.

A. B.

i. Bogan (Fred M.). **Malaria cured by Neosalvarsan.**—*U.S. Naval Med. Bull.* 1914. July. Vol. 8. No. 3. pp. 457–458.

ii. Reed (E. U.). **Two Cases of Malaria treated with Salvarsan.**—*Ibid.* 1915. Apr. Vol. 9. No. 2. pp. 278–279.

i. An account of a case of "tertian" infection where succinimid of mercury and large doses of quinine both failed to cure. An intramuscular injection of 0·45 gm. of neosalvarsan was then given with the happiest results, the drug acting as a specific and with extreme rapidity. The one dose sufficed and there had been no relapse five months after discharge from hospital.

ii. In one instance two intravenous injections of 0·6 gm. of salvarsan sufficed to bring an obstinate case of malaria to an end; in another 0·9 grm. of neosalvarsan apparently cured a long-standing infection.

The author thinks the intravenous method has no advantages over intramuscular administration and is liable to cause a marked febrile reaction.

A. B.

Summa. **Malaria tertiana-Rückfälle unmittelbar nach energischer Salvarsan-Behandlung.** [Tertian Malarial Relapses immediately after Energetic Treatment with Salvarsan.]—*Arch. f. Schiff- u. Trop. Hyg.* 1915. Feb. Vol. 19. No. 4. pp. 108–112.

The author, who was the Principal Medical Officer of the Military Hospital, Windhuk, South West Africa, concludes from his own experience and that of his colleague Westphal that salvarsan therapy is by no means an ideal method of eradicating malarial infection. In support of this view he records a number of cases of tertian malaria well treated by salvarsan which undoubtedly relapsed. The salvarsan was given intravenously and some of the cases received as many as six injections, the usual dose being 0·6 gm. This treatment freed the blood of parasites for the time being but, although the patients were transferred to localities known to be malaria-free, there appeared in their blood at varying intervals after the treatment both ring forms and gametocytes. Apart from the impossibility of fresh infection in the new

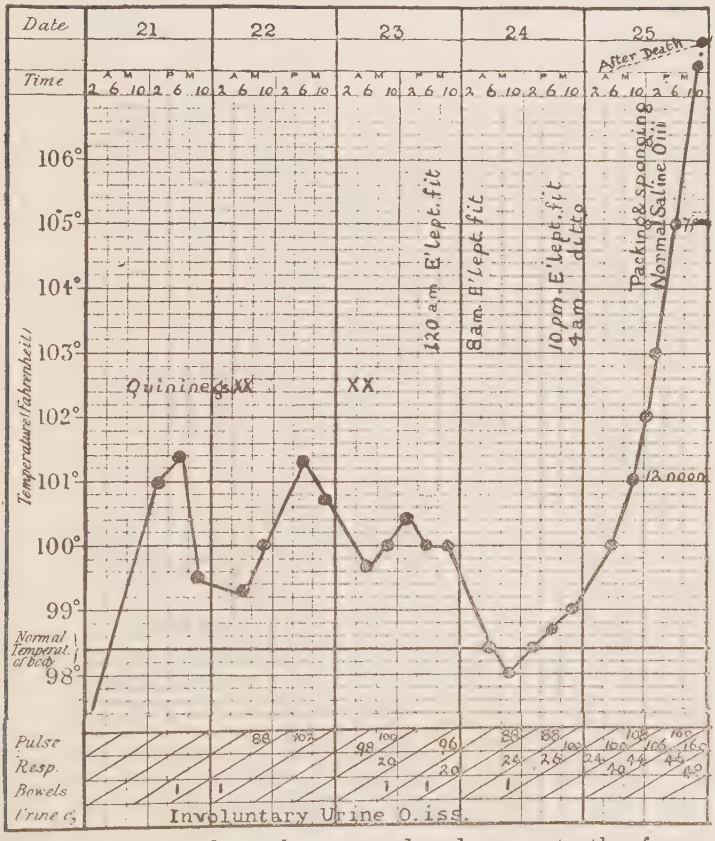
localities the presence of the sexual forms betokened true relapses, for the latter only occur in untreated or insufficiently treated cases. The shortest time between the treatment and the relapse was three weeks. A. B.

POLLOCK (C. E.). **Salvarsan on Malaria.**—*Jl. R. Army Med. Corps.* 1915. Feb. Vol. 24. No. 2. pp. 181–183. With a chart.

A soldier at Port Louis, who was being treated for syphilis by salvarsan, developed sub-tertian malaria immediately after temporary loss of sight but without any other symptoms pointing to arsenical poisoning. Forty-eight hours after getting his last dose of salvarsan he was given 20 grains of quinine hydrochloride. His temperature rose in the evening. The quinine treatment was continued and four days after receiving salvarsan he had an epileptiform attack which was repeated later.

He became very ill, his temperature rose, unchecked by quinine given intramuscularly and duly absorbed, and he eventually died. The post-mortem findings are detailed . It is to be noted that malarial parasites were found in the choroid plexus, heart, blood and spleen.

The author asks if the case was one of cerebral malaria or of salvarsan poisoning.



The temperature chart, here reproduced, suggests the former but the injection of quinine failed.

The symptoms pointed to the latter but the patient stood his early course of salvarsan perfectly well. He was one of a batch of six men who were injected the same morning and none of the others had any reaction.

Pollock suggests that the quinine given 48 hours after the salvarsan formed with it some toxic combination. Major L. W. HARRISON, R.A.M.C., adds a note recording his belief that death was due to salvarsan plus malaria, while Major S. L. CUMMINS, R.A.M.C. reports on the tissues sent him and records his conclusions as follows :—

" (1). The death was *not* caused by malarial coma, although the man had malaria in a chronic form.

" (2). The state of the kidney is what, perhaps, might be expected from salvarsan poisoning.

" (3). There is some evidence of a recent considerable destruction of blood-cells.

" (4). There was nothing *in the portion of brain examined* to indicate gumma."

[Taking into consideration the time when the man " went blind " it would seem that salvarsan poisoning might quite well account for the fatal issue.]

A. B.

von EZDORF (R. H.). **Anopheline Surveys. Methods of Conduct and Relation to Antimalarial Work.**—*U.S. Public Health Rep.* 1915. Apr. 30. Vol. 30. No. 18. pp. 1311–1320. With 3 plates.

This is a useful, practical kind of paper which, while it contains nothing new, may be read with advantage by those engaged in antimalarial work. As the author says, the local health officer should have the following information at his disposal :—

1 Amount and types of cases of malaria.
2. Seasonal prevalence in locality studied.
3. Location and kind of industries.
4. Form of water supply and drainage system.
5. Topographical and meteorological conditions, including :—
   (*a*). Number of natural water courses.
   (*b*). Natural direction of surface drainage.
   (*c*). Presence of ditches and of low, poorly drained areas.
   (*d*). Temperature.
   (*e*). Rainfall.
   (*f*). Direction of prevailing winds.

There are 34 known species of American anophelines and the following eight have been definitely shown to serve as hosts for the malarial parasites :—

Anopheles	*albimanus,*	*Anopheles*	*quadrimaculatus,*
,,	*argyritarsis,*	,,	*pseudomaculipes,*
,,	*crucians,*	,,	*pseudopunctipennis,*
,,	*intermedium,*	,,	*tarsimaculata.*

Notes on the recognition of adult anophelines and of their water stages with appropriate illustrations lead to a consideration of the equipment when engaged on a survey. Here it is :—

" One small canvas bag.

" One white enamelled dipper, with hollow handle.

"One stick for making extension to handle of dipper, and for beating a way through brush, briers, or tall grass.

"One small glass dropper, with the tip cut off, so that the opening is about one-eighth inch in diameter. This to be used in securing larvae and pupae from the dipper.

"Six small vials.

"Six small pill boxes.

"One note book and pencil.

"One entomological bottle, 4 inches long, 1 inch in diameter (a large test tube will serve equally well), with cork. The bottom of the bottle is filled for a depth of 1 inch with cotton and rubber bands saturated with chloroform. This is covered with a circular disk of cardboard or thin layer of cork. This is to serve as a catching bottle for collecting adult mosquitos."

The method of procedure is outlined and the various breeding places which may be encountered are mentioned.

Amongst these may be specially noted hog wallows, pools amongst rocks, and water from ice plants and steam plants.

The author states that adult anophelines were collected from such divers places as :—

"Garrets, bedrooms, on walls, under mosquito bars, behind pictures, on clothing, behind doors and furniture, in barns, open fireplaces, privies, chicken coops, wood and coal sheds, stables, garages, under porches and buildings, in wind-protected corners of porches, in empty barrels, trash heaps, wagons, carriages, automobiles, on trunks of trees, in the hollows of trees and tree stumps, in caves, eroded overhanging banks of streams, and on spider webs."

The necessity for making privies mosquito proof is emphasized.

"Spider webs and cobwebs are favourite resting places for Anopheles mosquitos, from which they will fly upon the slightest disturbance. The Anopheles appear hanging from a web, and as many as 60 have been counted on a single web."

There is nothing requiring special notice in the very sound remarks on the keeping of records, on antimosquito measures and on the general management of a campaign.

A. B.

McGuire (L. W.). **Quinine Prophylaxis of Malaria.**—*U.S. Naval Med. Bull.* 1914. Oct. Vol. 8. No. 4. pp. 571–576.

The investigations here recorded were carried out upon American troops (Marines) on the small island of Culebra in the West Indies. Two regiments were concerned: the first 877 strong with 60 cases, a percentage infection of 6·8, the second 852 strong with 49 cases, a percentage infection of 5·8.

The troops were exposed to infection during night manœuvres and it is stated that the variation of mosquitos in different localities probably accounted for the discrepancy in the percentage of infections of different detachments, irrespective of the density of the native population.

The latter numbers about 750 living chiefly in two small towns. From an examination of native children (method employed not stated) the malarial index is given as about 75 per cent.

The following tables summarize the author's observations.

TABLE I.

	3-inch battery (161 men).	Companies C and I (242 men).	Company F (126 men).	Company E, Signal Corps (125 men).*	Company H (131 men).
Regiment	First.	First.	First.	First.	First.
Date of landing ..	Jan. 13, 1914.	Jan. 13, 1914.	Jan. 13, 1914.	Jan. 13, 1914.	Jan. 13, 1914.
Re-embarked ..	Feb. 6, 1914.	Feb. 6., 1914.	Feb. 6, 1914.	Feb. 6, 1914.	Feb. 6, 1914.
Quinine prophylaxis	Yes.	Yes.	Yes.	Part of time.	Yes ; after Jan. 26.
Amount	8 grains.†	10 grains twice a week.	7 grains daily for first 2 weeks, then 5 grains.	7 grains daily after first 10 days.	6 grains twice a week.
Location of camp ..	Low and near village of Roosevelt.	Point Vaca, high.	Point Soldado, high.	Old naval station.	Near Dewey, high.
Mosquitoes	Numerous.	Few.	Few.	Numerous.	Not abundant.
Net protection ..	Yes.‡	Yes.‡	Yes.‡	Yes.‡	Yes.‡
Per cent. of infection	12·4.	3·3.	2·3.	11·2.	2·2.

Type of malaria (percentage), estivo-autumnal, 25 ; tertian, 75.

* Signal company was scattered at times over various parts of the island.
† Eight grains for 10 days, then 6 grains, skipping 2 days separately each week.
‡ Except when exposed during night manœuvres.

TABLE II.

	Main camp (602 men).	Company A (122 men).	Company D (128 men).
Regiment	Second.	Second.	Second.
Date of landing..	January 11th, 1914.	January 11th, 1914.	January 11th, 1914.
Re-embarked	February 6th, 1914.	February 6th, 1914.	February 6th, 1914.
Quinine prophylaxis	None.	None.	None.
Per cent. of infection	4·3.	3·2.	14·8.
Location of camp	Near Dewey, elevated.	High, on small island, Culebrita.	Low, Mangrove Harbour.
Mosquitoes	Not numerous.	Not numerous.	Numerous.
Net protection	Yes.*	Yes.*	Yes.*

Type of malaria (percentage), estivo-autumnal, 48·8 ; tertian, 51·2.

* Except when exposed during night manœuvres.

After discussing the experiences of some other officers of the United States Navy as regards quinine prophylaxis in the Panama Canal Zone and quoting various authorities as to dosage and method of administration McGuire advances the following conclusions :—

" 1. Quinine in doses of from 5 to 8 grains daily will not prevent malaria, although it may retard or delay the symptoms.

" 2. Persons infected with malaria while taking quinine prophylaxis may not show any evidence of the disease while taking the quinine, but when it is discontinued will come down with acute malaria paroxysms.

" 3. After taking quinine for a long period a certain tolerance for the drug may be established, causing more difficulty in permanently curing these cases.

" 4. Quinine prophylaxis often masks malaria, the symptoms being atypical, and often banishes the parasite from the peripheral circulation, rendering the exact diagnosis very difficult.

" 5. It is believed that the eradication or great reduction of malaria in districts which were formerly infected was due to the treatment of the disease already present, combined with improved sanitary conditions, which destroy the mosquitoes and larvae, rather than to preventing infection by so-called prophylactic doses of quinine.

" 6. To prevent malaria the ideal method is to eradicate the mosquitoes, if possible, or to prevent the mosquitoes from biting by net protection, combined with the treatment of persons already infected, thus eliminating the source of infection.

" 7. Quinine prophylaxis as a routine is not advised, but for an expeditionary force during a short, active campaign in a malarial country it is believed that malaria paroxysms can be held in abeyance temporarily in a certain proportion of the men by giving quinine, 5 to 10 grains daily."

[A. B.

POLLOCK (C. E.). **Notes on the Incidence of Malaria among European Troops in the Sierra Leone Command, with Special Reference to the Effect of Mobilization.**—*Jl. R. Army Med. Corps.* 1915. Feb. Vol. 24. No. 2. pp. 118–120.

An account of the results obtained by the prophylactic administration of quinine in the case of men of the Royal Artillery and Royal Engineers in garrison at Sierra Leone from October 1913 to the end of January 1915. The number of men under observation was nearly 300.

The hydrochloride was given in solution at first in doses of 15 grains twice a week and then, owing to the unpleasant symptoms produced, in 10 grain doses twice weekly.

Tables show that the incidence of malaria depended more on the degree of exposure to infection than on the length of service, and that after six months' residence despite the prophylactic measures, which included screening of barrack rooms and the use of mosquito curtains, roughly 75 per cent. of the troops suffered from malaria even though the rainfall during this period was the lowest ever recorded in Sierra Leone.

There was some evidence to show that the dose of quinine precipitated a malarial attack.

The author concludes that quinine prophylaxis, as carried out, was not very successful and that it accounted for some of the anaemia and debility which the men presented. [It would seem that *none* of the preventive measures were efficient and in the absence of more

information the results recorded cannot be considered as very enlightening. Many more details are required, as will be evident from a study of STOTT's paper on his work at Mandalay. See above]

A. B.

PARROT. **La Quininisation préventive dans les écoles primaires d'Algérie.** — *Malariologia* (*Propaganda Antimalarica*). 1915. Apr. 15. Vol. 8. No. 1–2. pp. 12–16. With 3 diagrams.

A brief account of the methods followed and the results achieved in the systematic quininisation of children attending the primary schools in Algeria. The salt of quinine used is the bihydrochloride and it is given daily in doses of 20 centigrammes to all between the ages of 5 and 19 years. The chocolate tablets with tannate were tried, but did not prove a great success. The measure has now become popular, the results are very satisfactory, and the author lays stress on the educative rôle which such school quininisation plays.

A. B.

MEMMI (Guglielmo) & MARTELLI (Pier Nello). **La Malaria nell' Ospedale di Grosseto negli anni 1913–1914. Rendiconto statistico.**— *Malariologia* (*Propaganda Antimalarica*). 1915. Apr. 15. Vol. 8. No. 1–2. pp. 17–27.

The authors remark that the number of cases of malaria admitted into a general hospital is a very reliable index of the amount of malaria in the district served by it. The annual number of cases admitted to the hospital at Grosseto has fallen continuously during the last 15 years from 1704 in 1900 to 78 only in 1914. Out of this latter number there were three deaths in all, from aestivo-autumnal fever; two of the cases being in octogenarians and one in a child aged six years.

J. B. N.

PELOSI (Giovanni). **Relazione della Campagna antimalarica del 1913 nel Comune di Foiano Valfortore.**—*Malariologia* (*Propaganda Antimalarica*). 1915. Apr. 15. Vol. 8. No. 1–2. pp. 34–38.

The anti-malarial campaign in Italy is now being very properly extended to the winter treatment of the chronic cases of malaria, who serve as reservoirs of the disease when the hot season arrives. In the district in question 29 of such patients were treated with State quinine during the months of January, February and March, 1913. The general prophylactic treatment of the population was commenced on the 8th of May, and continued until November, 350 individuals being submitted to it in all; 69 cases of malaria occurred during that period, of which two were fatal. The usual complaints are made as to the apathy of the poorer classes of the community in connection with this beneficent measure.

J. B. N.

FLU (P. C.). **Malaria en malariabestrijding.** [Malaria and its Prevention.] –23 pp. 1914. Batavia: Javasch Boekhandel en Drukkerij.

A pamphlet written in a popular style, and evidently intended for perusal by non-professional people. The author commences with a short account of the successive steps in the discovery of the nature of malaria, and then proceeds to describe with suitable brevity the natural history of the mosquito. Practical directions for building houses in mosquito-affected localities follow, and the paper is terminated by rules for the self-administration of quinine.

J. B. N.

GASBARRINI (A.). i. **Studii sulla malaria. 2ª nota. Ancora sulla deviazione del complemento nell' infezione malarica.** [Further Remarks on the Deviation of Complement in Malaria Infections.] —*Clinica Med. Ital.* 1914. Sept. Vol. 53. No. 10. pp. 665–677.

ii. **3ª nota. Sul comportamento della reazione di Wassermann (metodo originale e modificato) e della prova di Pick, e Pribram nella malaria.** [The Behaviour of Wassermann's Reaction, both Original and Modified, and of Pick and Pribram's Reaction, in Malaria.]—*Malaria e Malat. d. Paesi Caldi.* 1914. July-Au Vol. 5. No. 4. pp. 231–253.

i. In a note published in *Zeitschrift für Immunitätsforschung und experimentelle Therapie* the author suggested the employment of the Bordet-Gengou reaction as a means of diagnosis in latent malaria [see this *Bulletin*, Vol. 3, p. 145.] He now furnishes the results obtained from 22 cases of malaria, acute and chronic, as follows :—

1. The blood-serum from cases of malaria, taken during either the rigor or the febrile stage, and for a few days after an acute attack, will deviate complement, if it has first been deprived of its natural haemolytic amboceptors by Rossi's method. This consists in mixing 1·5 cc. of the serum with 0·5 cc. of well-washed sheep's corpuscles, and keeping the mixture in ice for 20 to 30 minutes. The corpuscles are then removed by centrifuging in a tube kept cool with ice.

2. In latent malaria, the same reaction may be obtained, but more feebly.

3. In chronic malaria the reaction is always negative.

ii. The contents of this paper are nearly the same in substance as those of the previous one, with the exception that the author tried Desmoulière's modified antigen. This is prepared by triturating, and drying at blood heat, human syphilitic liver, taken from the body within 48 hours after death. The dried powder is extracted with anhydrous ether to remove all fats, fatty acids and cholesterin and the extracted powder is again dried in the incubator and then macerated in absolute alcohol for 72 hours, in the proportion of one gramme to every 20 cc. To every 10 cc. of the cooled and filtered alcoholic solution 10 centigrammes of pure powdered cholesterin is added. The antigen thus obtained must be kept at room temperature and out of the influence of light. For use it is diluted with 15 times its volume of normal salt solution, and is employed for the Wassermann test in the quantity of 0·3 cc. (*Presse Médicale*, 1913, Nov. 5. No. 90). The author finds that an antigen thus prepared acts quite as well as a simple aqueous extract of syphilitic liver.

With the Brendel-Müller method the author finds that the reaction of malarial serum is less pronounced than with the unmodified Wassermann process. This reaction is based on the following principle. The serum of a presumed syphilitic subject is first incubated for 25 minutes at blood heat with a tested antigen, and the required quantity of sheep's corpuscles, suspended in salt solution, is then added. If the serum contains specific antibodies, haemolysis does not occur, or is much reduced from the weakening of the complement by the heating. (*Münch. Med. Woch.*, 1912. No. 32, p. 1,754).

In latent malaria Pick and Pribram's phenomenon is not obtained. It is based on the fact that specific sera extracted with ether acquire an anti-complemental power, so that they react without the addition of extract, in the presence of guinea-pig complement (*Biochem. Woch.* Vol. 9. Nos. 5–6).

J. B. N.

SUTHERLAND (W. D.) & MITRA (G. C.). **The Wassermann Reaction in Malaria, Kala-Azar and Leprosy.**—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 984–989.

The authors go fully into the literature of the subject. Finding the results greatly at variance they proceeded to examine the blood of 50 cases with a view to ascertaining definitely if malarial infection influences in any way the Wassermann reaction. Of the 50 cases, 32 were benign tertian, 17 malignant and one of both these varieties (mixed infection). No quartan cases are recorded.

	Cases.	Positive W.R.	Percentage.
Cziknawerow	13	..	..
Manu Muscel and Vasilu ..	12	..	..
Schoo	38	22	57·89
Weinfurter	1	1	100
Bates	167	37 (30 lues)	22·15 (4·19)
Fletcher	50	..	..
S. and M.	50	9	18
	331	69	21
or, deducting the known lues cases	..	39	11·8

They give a table, here reproduced, comparing their results with those of other workers and conclude as follows :—

" Our own figures are thus seen to be akin to those given by Bates and by Fletcher. Schoo's figures *may* be true of Holland ; they certainly do not seem to indicate the real state of affairs in the tropics. Of our 9 positive cases at least 3 were probably syphilitic, which brings our percentage down to 12 or very nearly the 11·8 given above. It must be remembered that our positive results were obtained during the *acute* attack. Chronic malaria does not affect the Wassermann reaction at all, and in our opinion all that a physician has to do is to wait until his patient's peripheral blood has been clear of parasites for, say, a week before he sends him to have his Wassermann reaction taken."

A. B.

MATHIS (C.) & HEYMANN (P.). **La Réaction de Wassermann dans le paludisme.**—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 258–259.

The authors, working in French Indo-China, examined 21 cases of recent and long-standing malarial infection (13 malignant, 5 benign tertian and 3 quartan) for the Wassermann reaction and obtained a uniformly negative result. They give no details, merely remarking that they used the technique in force at the Pasteur Institute in Lille and employed as antigen the liver from a case of hereditary syphilis. Their references to the literature are incomplete.

A. B.

PEREKROPOFF (G. J.). **Ueber Kulturen der Plasmodien des tropischen Fiebers (Malaria tropica).** [The Culture of the Plasmodium of Tropical Malaria.]—*Arch. f. Protistenkunde.* 1914. Nov. 3. Vol. 35. No. 2. pp. 139–153. With 3 plates.

The author declares that by employing a slight modification of the method of BASS and JOHNS [see this *Bulletin*, Vol. 1, pp. 22–24; and Vol. 3, p. 438] he was able in two cases out of seven to observe *in vitro* not only the schizogony of *P. falciparum* but its cycle of sporogony with the formation of sporocysts in the red cells and the discharge of sporozoites from these erythrocytes. His method differs from that of BASS and JOHNS in the following particulars.

1. He used four times as much 50 per cent. dextrose solution, i.e., 0·4 cc. to 10 cc. of malaria blood.

2. He inactivated the blood serum [presumably he means defibrinated blood] for a longer period, i.e., for half an hour at 41° C. and for another half-hour at 42° C.

3. He transplanted to blood serum [defibrinated blood ?] wherein the complement had been killed at 55 to 56° C.

4. This transplantation was made five to six hours after the normal segmentation of the parasites had taken place.

5. The material was transferred to a rich medium which is made by adding 0·04 cc. of a 50 per cent. dextrose or maltose solution to 0·2–0·4 cc. blood serum [defibrinated blood ?].

6. After transplantation the proportion of parasite-holding red cells to fresh erythrocytes is as two-fifths to three-fifths.

7. Omission of the centrifugation of the infected blood in order to avoid any traumatism.

The blood was taken from the patient five hours after the malarial attack and two to three hours after a full meal, at a time when the temperature was low. Specimens were examined at intervals of two, four and six hours, films being made on cover glasses, fixed in methyl alcohol and stained with Giemsa. The transplantation was effected after 24 hours, at the time of sporulation, and also six hours later, the latter method yielding better results.

The two successful cases were both fresh infections and from both 20 cc. of blood were taken for purposes of the research.

At first free-swimming merozoites could be observed, which after five or six hours were found attached to the red cells or already inside them.

The author describes and illustrates the development both of the ordinary schizonts and of the young endoglobular gametes. In some of the red cells Maurer's dots were well marked. The various stages are described in great detail but the chief phases of development may be given more or less in the author's own words as follows :—

(i). The development of the parasites *in vitro* at 41° C. with pigment formation commences in the fourth hour of incubation.

(ii) Between the seventeenth and twenty-fourth hours schizogony can be seen. In a few cases this occurs also at the twenty-seventh hour.

(iii). Gamete formation begins at the seventeenth hour and continues up to the twenty-seventh hour.

(iv). The formation of ookinets [travelling vermicules] commences at the twenty-seventh hour. In a few cases this process can be observed at an earlier period.

(v). Sporocysts form at the thirtieth hour. They occur *in the red blood corpuscles*, which bear the same relation to the sporocysts as does the membrane of the mosquito's stomach to the familiar oocyst.

(vi). Bursting of the sporocysts and the setting free of masses of sporozoites are phenomena met with at the fortieth hour.

(vii). By the forty-third hour the cycle of development is at an end and the sporozoites are invading the red cells.

[All these stages are illustrated by three coloured plates which, whatever may be thought of their significance, are undoubtedly well executed. It may, however, be said that the so-called red cell sporocysts bear no resemblance in structure or size to the well-known oocysts seen in the stomach of an infected anopheline.]

Some of the drawings are supposed to show in addition another developmental process, also partly described in the text, namely, schizogony of the macrogametocyte [parthenogenesis.]

A few other points may be noted. The discharge of merozoites after complete schizogony could not be demonstrated in stained preparations. As Ziemann noted, it evidently takes place fairly quickly. By the twenty-fifth hour it was possible to differentiate the male and female crescents. Copulation of the gametes was observed at the twenty-seventh hour. The occurrence of flagellation is mentioned but the conditions under which it was seen are not described. [If gametocytes were present in the warm culture they would naturally flagellate when removed to a slide just as in the case of an infected human being. As the author distinctly states that he could not demonstrate flagellation in stained films of his culture, there is no evidence to show that it actually did occur in his culture tubes.]

The author assumes that long continued and obstinate cases of malaria are to be explained partly by parthenogenesis of the female crescent and partly by a formation of sporocysts in the patient's blood just as he has observed it in culture, and he believes that Glogner's hypothesis of gamete copulation in man is now proved to be correct.

The bursting of the oocysts seems to occur fairly rapidly, for sporozoites are rarely found near an oocyst.

It was possible to observe a cycle of schizogony throughout a second generation of parasites. In 48-hour cultures a continuation of sporozoite formation followed by an invasion of red cells was noted, and later

small, round or sickle-shaped sporozoites which did not enter erythrocytes could be seen free in the plasma. The parasites lived *in vitro* for 5½ days, at the end of that time representing the beginning of a fifth generation if 27 hours is taken as the period for one generation to accomplish its development. Thereafter degeneration and death occurred.

[Although this is a very interesting paper the nomenclature is somewhat confused and one cannot help feeling that Perekropoff has, here and there, rather taken things for granted. Certainly in view of the locality of his so-called sporocysts, the temperature at which development took place, the size of the cysts and their general characteristics, confirmation of his research is required before his findings can be accepted. Important links in the cycle of development are missing and though, if his work is substantiated, it will mark a distinct advance in our knowledge, it would be well at present to mingle interest in it with a little healthy scepticism.]

A. B.

MacGilchrist (A. C.). **Quinoidine: Its Characters, Composition and Lethality to Protozoa. (Cinchona Derivatives Inquiry.) Fourth Communication.**—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 888–906.

Quinoidine is a mixture of the uncrystallizable alkaloids in cinchona bark and bears the same relation to the crystallizable alkaloids, quinine, quinidine, cinchonine and cinchoninidine that molasses does to sugar. The term "amorphous alkaloid" loosely used in the past should never be applied to it nor to the residual alkaloid from which it is obtained. This residual alkaloid, derived from the bark of *Cinchona ledgeriana* after the quinine has been extracted, consists of the remaining crystallizable bases plus all uncrystallizable bases plus impurities.

Commercial quinoidine is represented by the masses containing these uncrystallizable bases plus impurities. It varies in physical characters and may contain traces of crystallizable alkaloids. It is believed to consist chiefly of the uncrystallizable anhydro-bases—diquinicine and dicinchonicine—which unlike quinicine and cinchonicine (products of manufacture) exist naturally in the bark.

Quinoidine is almost insoluble in water but dissolves readily in dilute acids, alcohol and chloroform. In ether it is only partly soluble. Sethurner, Prain and Waters have stated that quinoidine has a greater anti-malarial effect than quinine. Indeed the last-named found that while it caused no nausea or other unpleasant effects it was from three to five times as effective as quinine sulphate and he introduced a preparation called *Laverain* containing 1/3 grain ammonium picrate and 1/32 grain arsenious acid to every 2 grains of quinoidine.

MacGilchrist, considering quinoidine worthy of investigation, obtained some of tarry consistence from Mungpoo.

He gives the results of its analysis, which was chiefly conducted by his assistant Dr. Sarkar, and for the details of which the original paper must be consulted.

Having found that the non-alkaloidal portion of quinoidine contained no active principle he proceeded to test the pure quinoidine

alkaloid as regards its lethality on the lines adopted in his previous work [see this *Bulletin*, Vol. 5, p. 49]. He found it not nearly so deadly to Paramoecium and other protozoa as is quinine hydrochloride and he promises to show in a future communication that quinoidine is much inferior to quinine as an anti-protozoal or anti-malarial agent.

At the same time he explains how PRAIN was probably led into error by a faulty assumption.

A. B.

LAWSON (Mary R.). **Adult Tertian Malarial Parasites attached to Peripheral Corpuscular Mounds. The Extracellular Relation of the Parasite to the Red Corpuscles.**—*Jl. Experim. Med.* 1915. June. Vol. 21. No. 6. pp. 584–592. With 4 plates.

The author's previous work on the migration of malarial parasites and their exclusively extra-corpuscular situation are now well known. [See this *Bulletin*, Vol. 4, p. 85 and p. 293]. In this paper she deals again with the latter theory and seeks to prove that the plasmodium attaches itself to the outer surface of the red cell by means of pseudopodia which encircle a portion of the haemoglobin substance. The latter gets squeezed up into a mound, the base of which is clasped by a single pseudopodium or by two pseudopodia meeting and fusing. She says :—

"I believe that the first pseudopodia thrown out arise from the cytoplasm of the parasite near the nucleus. Other (accessory) pseudopodia may be thrown out from any part of the cytoplasm, whenever it becomes necessary for the parasite to secure a firmer hold on the red corpuscle ; i.e., when a corpuscular mound to which it is attached becomes dehemoglobinized (decolorized), or as the parasite increases in size.

"A very young parasite may find it necessary to use its entire cytoplasm in order to encircle a corpuscular mound, thus giving the appearance, when attached to a surface mound, of a very slender ring with a chromatin dot. When a corpuscular mound encircled by a young parasite is viewed from above, the characteristic ring-form parasite picture is seen."

Referring to the remarkably interesting plates of benign tertian infection which illustrate the article, she points out that the mounds are clearly visible and that though the pseudopodia may be wholly or in part obscured by the nuclei of the attached parasites they can frequently be traced round the peripheral mounds. The latter usually becomes quickly decolourized and the author believes that the "achromatic area" or "milky zone" so long believed by many to be an integral part of the malarial parasite is in reality a decolourized, peripheral corpuscular mound. As an additional proof of the extracellular position of the young parasites she cites the fact that their nuclei or protoplasm may be often seen projecting beyond the periphery of the red cell. [This is certainly well brought out by four of the microphotographs.]

After some remarks on the irregularity of pigment formation in connection with the young parasites and a note to the effect that the absence of pigment does not necessarily mean that no damage has been done to the red cell, the question of multiple infection of corpuscular mounds is considered. It is stated to be an accidental occurrence.

The author has extended her investigations to adult tertian parasites, which she believes may act just like the young plasmodia, though their

constricting effect upon the mounds appears to be greater and their nuclei usually hide the encircling pseudopodia while they bring about more rapid dehaemoglobinization. Adult parasites are, however, usually seen attached to surface mounds and the infection of peripheral mounds is easily overlooked and it is only to be found in any abundance shortly after a parasitic migration at a time when the infected red cells are not badly damaged.

Conjugation has never been observed and Lawson summarizes her interesting and heterodox views as follows :—

"1. The malarial parasite is extracellular throughout its entire life cycle ; that is, when it is not free in the blood serum, it is attached to the external surface of the red corpuscle.

"2. Adult parasites follow the same procedure in attaching themselves to the outer surface of the red corpuscles as do the young parasites.

"3. Adult parasites are most frequently seen attached to surface corpuscular mounds.

"4. Corpuscular mounds projecting at the periphery of the red corpuscles and encircled by the pseudopodia of adult parasites, are proof positive of the extracellular relation of the adult parasite to the red corpuscle.

"5. Adult parasites attached to peripheral corpuscular mounds are only found in appreciable numbers when the red corpuscles are not badly damaged, so that the mounds show more or less hemoglobin content.

"6. The nuclei or protoplasm of adult parasites extending beyond the periphery of the red corpuscles is additional evidence of the extracellular relation of the parasites to the red corpuscle."

The coloured plate which she presents is well worthy of attention and study.

A. B.

STEVEN (W. S. R.). **Report on an Investigation in regard to the Prevalence of Malaria amongst the Troops stationed at Karachi, 1913.**—*Jl.R. Army Med. Corps.* 1915. Mar. Vol. 24. No. 3. pp. 251–261.

There is nothing new in this paper, which is chiefly of local interest. During the last five months of 1913 there were 380 admissions for malaria occurring amongst the British troops at Karachi and the author's report explains the reasons for the outbreak and recommends measures for the prevention of any recurrence.

Anopheline breeding places are described and the larvivorous fish *Lebias dispar* was found to be effective in keeping mangrove swamps, streams, pools, etc., free of larvae.

The Anophelines found were *Nyssomyzomia rossi*, *Neocellia stephensi* and *Cellia pulcherrima.*

A. B.

NICOLLE (Charles). **Le rôle des moustiques dans la transmission du paludisme suspecté en 1774.**—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 279–280.

The Abbé Jean-Baptiste de Fortis in his book "Voyage en Dalmatie," dated 1774, records a conversation with a certain ecclesiastic who expressed the opinion that many of the fevers of Dalmatia were due to the bites of mosquitos which had previously fed on a dead body or on a poisonous plant.

The Abbé states that he considers the idea ingenious and that possibly the miasmas might also be attributed to this cause.

Nicolle comments shortly upon this early opinion and by a further quotation shows that the Abbé was not quite so sound a reasoner as he appears from his remarks on malaria and mosquitos.

A. B.

O'Connell (Mathew D.). **The Meteorology of Malaria.**—*Jl. Trop. Med. & Hyg.* 1915. May 1. Vol. 18. No. 9. pp. 97–99.

The author discusses the atmospheric conditions obtaining at Culebra, the central station of the Panama Canal, and compares them with those found in spinning and weaving sheds in Lancashire and Ireland. As already pointed out in this *Bulletin* [Vol. 2, p. 545] he is of opinion that such conditions can of themselves produce fevers of a remittent and intermittent type.

A. B.

i. Sergent (Edmond & Etienne). **De quelques préjugés en matière de paludisme.**—*Propaganda Antimalarica.* 1914. Dec. 31. Vol. 7. No. 6. pp. 163–168.

ii. Sergent (Edmond). **L'idéal d'un Roi d'après Goethe. Un précurseur de l'antipaludisme.**—*Ibid.* pp. 169–170.

i. In this little pamphlet the authors detail the erroneous views commonly held by the public in Algeria as regards malaria and show how they may best be corrected. They consider such questions as the relation of malaria to soil disturbance, the reason why a cold bath is supposed to be a cause of fever, the relation of trees to mosquito prevalence. Further they deal with such fallacies as the view that quinine enlarges the spleen, and that it causes abortion. [As these kind of questions crop up in most tropical countries this pamphlet should be useful for practitioners who have to disabuse the minds of their patients as regards such fallacious ideas.]

ii. Dr. Sergent quotes Faust to show that Goethe's ideal of a sovereign and of a benefactor of mankind was, as indicated by the passage cited, one who accomplished anti-malarial work and declared war on the breeding grounds of anophelines.

A. B.

Maggiore (Salvatore). **Rilievi statistico clinici sulla malaria infantile nella Città e Circondario di Palermo.** [Clinical Statistics with regard to Infantile Malaria in the City and Suburbs of Palermo.] —*Pediatria.* 1915. June. Vol. 23. No. 6. pp. 449–452.

A short report on the nature of 91 cases of malaria observed in children under five years of age during the three years 1912–1914. Out of this total 36 were of children under two years of age. The cases of estivo-autumnal fever showed none of the malignity so often seen in adults with that form of malaria. It is remarked that in children of these tender ages the spleen is usually but little enlarged, and the enlargement can often only be made out by percussion. Even in chronic cases of estivoa-utumnal fever, the spleen never reaches the dimensions found in kala azar.

J. B. N.

BLACKWATER FEVER.

AFRICA. **Blackwater Fever in the Tropical African Dependencies. Reports for 1913.**—96 pp. 1915. London: Printed under the Authority of H. M. Stationery Office. (Cd. 7792). Price 1*s*. 0*d*.

This Blue Book consists chiefly of records of blackwater fever cases observed during 1913 in the Gold Coast, Nyasaland, Uganda, Northern and Southern Nigeria, Sierra Leone and the East Africa Protectorate. No cases occurred in the Gambia. It is copiously supplied with charts and tables and, while doubtless a useful contribution to the literature, cannot be easily dealt with in a short summary, for much of its value depends upon the details of the cases. Hence only a few points will be noted here. It will certainly be an advantage when the new schedule, a modified form of that prepared by STEPHENS [see this *Bulletin*, Vol. 5, p. 254], comes into use. The following statistics as regards the number of cases in each colony or protectorate and the corresponding mortality rates are interesting:—

	Cases.	*Percentage mortality rate.*
Gold Coast..	21 ..	33·3
Sierra Leone	10 ..	10
Southern Nigeria	21 ..	23·8—One case may have been yellow fever.
Northern Nigeria	17 ..	35·29
East Africa Protectorate..	15 ..	26·6
Uganda	58 ..	20
Nyasaland	7 ..	14·2

There is a great similarity about the clinical records of the cases and in most instances the close association with malaria and also with the intermittent taking of quinine is well marked. The exact relationship of the latter to the onset of the disease could, however, only be accurately determined in the manner adopted by STEPHENS and STOTT in their research, recently reviewed in this *Bulletin* [Vol. 5, p. 354].

Of special interest are the observations of COOK, included as an appendix to the Uganda report. He cites five cases which tended to show that tick (spirillum) fever and not malaria had acted as a predisposing cause. The temperature chart which he gives of one of the cases is very suggestive of relapsing fever.

Other matters worth noting are the number of children who suffered from blackwater, the presence of a benign infection running concurrently with the attack, as reported by STANNUS from Nyasaland, the danger of the patient being left with damaged kidneys, the inadvisability of moving a patient suffering from haemoglobinurie fever, and the association of the disease with a special locality, as instanced by BARCLAY of Blantyre in the case of a patient who lived in a house with the following remarkable history:—

"(1). The original occupant died on the way home. He is said to have died of malaria.

"(2). The second occupant, an Italian, was found dead in bed by myself in 1906, having died about two hours before I reached him; his temperature when I saw him was 104°, and there was no doubt he died of severe malaria.

"(3). The third occupant suffered various severe attacks of malaria, and eventually died in Zomba Hospital from an attack of blackwater.

"(4). The present patient went to live there on the 20th August, 1912, and developed blackwater on the 26th April, 1913. At present the house is unoccupied."

All the reports give information as regards the insect fauna of the district where the cases occurred, but this is of such a general nature that it is not as a rule of much value from the etiological point of view.

A. Balfour.

BURKITT (R. W.). **Blackwater Fever.** —*Lancet.* 1915. May 1. pp. 908-909. With a chart.

Burkitt, writing from Nairobi, records two cases of blackwater fever successfully treated by neosalvarsan. He speaks of its apparently wonderful effect in these two instances, for both of them were severe and the first was practically in a hopeless condition when the drug was tried. In this case a single dose of 0·9 grm. was given intravenously with 2 pints of saline, and a marked change for the better was apparent within two hours. Vomiting ceased, the temperature fell, insomnia disappeared and the urine cleared up. Previously the patient, aged 28 and with a malarial history, had been given saline infusions, calcium chloride, pituitary extract, morphine and hyoscine. [It is worth noting that the day before the neosalvarsan was given vomiting ceased for six hours, and it is just possible that the improvement following the neosalvarsan was due in part to the other remedial measures adopted].

The same dose was used in the second case, a man aged 50 who had suffered from a severe attack of blackwater 25 years previously. The record of the case certainly shows that he was doing very badly until the neosalvarsan was given, and that his illness took a marked change for the better after the injection.

[More cases must be recorded before the exact value of neosalvarsan in this condition can be determined, but at least the drug did no harm, and it is interesting to compare Burkitt's results with those of WERNER. See this *Bulletin*, Vol. 4, p. 376.]

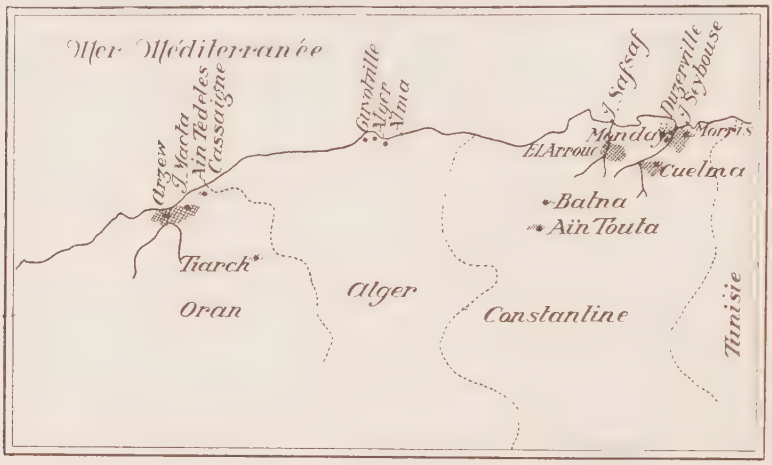
A. B.

PARROT (L.). **Essai sur la fièvre bilieuse hémoglobinurique en Algérie.** —*Malariologia* (*Propaganda Antimalarica*). 1915. Apr. 15. Vol. 8. No. 1–2. pp. 27–33. With 1 map.

It has generally been supposed that blackwater fever is rare in Algeria, but this is not altogether the case. Up to 1904 it had received very little consideration but in that year the Sergents drew attention to certain records regarding it, which showed that in certain districts it was far from uncommon, and that it was most frequent in the regions where malaria was severe.

As a result of his inquiries Parrot has prepared a chart, here reproduced, showing the areas from which blackwater cases have been recorded. It will be noticed that these are nearly all on the sea coast or close to it, and further that they are in the neighbourhood of the

mouths of streams, or in the hollows of the valleys which these streams water. On the high plateaus the cases do not seem to be very numerous.



Sketch of Algeria, showing the foci of blackwater fever.

The close association of haemoglobinuric fever and malaria is well marked, and the best way to get rid of the former is to fight the latter. Apparently no case of blackwater has yet been recorded amongst the indigenous Arabs and Berbers.

The epidemiology of the disease is briefly considered, but the only points in the paper requiring further notice are the statements that the abuse or untimely ingestion of quinine do not seem to play a part in producing the condition, at least in the great majority of cases, and that the mortality is distinctly high, being 49·1 per cent. in 24 cases recorded. As Parrot observes, this is a much higher rate than that recorded in other French colonies and shows that Algerian blackwater is far from being negligible.

A. B.

Gasbarrini (Antonio). **Studii sulla Malaria. VI. Ricerche su una particolare forma di emoglobinuria sperimentale.**—*Sperimentale.* 1915. Apr. 30. Vol. 69. No. 2. pp. 301–326.

A continuation of the author's laboratory studies on points connected with malaria. He finds that he is able to produce in dogs and rabbits an experimental haemoglobinuria by injecting into either the peritoneal cavity or the veins, the laked blood of the same animal in quantities proportioned to its weight. If however the laked blood has been subjected to a preliminary heating for three hours at 56° C., this phenomenon does not occur. Like the author's previous contributions, this paper is one for the specialist.

J. B. Nias.

Book Review.

Gimlette (John D.), [M.R.C.S., L.R.C.P.]. **Malay Poisons and Charm Cures.**—viii + 127 pp. Crown 8vo. 1915. London: J. A. Churchill, 7, Gt. Marlborough St. [Price 3/6 net.]

This little book, though it is but an introduction to a large subject, contains much that is interesting, not only to the medical jurist and to the pharmacist, but also to the ethnologist and the philosopher.

The first chapter surveys the orbit of the native Malay practitioner. The Malays would seem to be a much bedevilled folk. They live in fear of two kinds of jins—one kind that haunt the firmament and the waters, or go to and fro in the earth like Satan, or ride upon the wings of the wind; and another kind that possess the inward parts of man. It is these latter that are necessarily and specifically associated with the ills that flesh is heir to, although disease in general is sent by God and may be influenced to some extent by jins of the other kind. This being the Malay idea of pathology and nosology, preventive medicine among them is chiefly a matter of amulets and talismans, and therapeutics largely a business of incantations—though not wholly so, since the Malays, like the proletariat of more advanced countries, have great faith in the powerful grace that lies in herbs. As a consequence the native practitioner, or *Bomor*, is not only a sorcerer familiar with all the "breathed spells" that form the appropriate and essential part of the treatment of disease, but also a pharmacist deeply versed in the plants and drugs that constitute the adjuvants and excipients of his ghostly medicaments. These Bomors may be of either sex, but "are generally crafty old men." There are specialist Bomors having peculiar power over particular orders of jins, and there are Bomors-in-chief (who usually are women) before whom all lesser Bomors are flat and unprofitable, but serious cases of poisoning are recognised as being beyond the efforts of the most potent Bomor. The spells—of which some fine examples are here translated—also vary in intensity; the mildest of them are mere deprecations, beginning with a polite remonstrance and ending in a diplomatic warning; the worst are resounding volleys of execrations that might have made Ancient Pistol cry mercy.

Chapter II treats of "fish" used as poisons by Malays, the term "fish" being used in the popular sense, to include marine animals of other kinds. The author mentions the sting-rays (or "stingarees" as the *Trygonidae* are called in Australia), several species of cat-fishes (*Siluridae*), and the parrot-fishes or globe-fishes of the genus *Tetrodon*, the qualities of all of which are also well known in other parts of the world. The cat-fishes, of which the most formidable in Indo-Pacific waters are those of the genus *Plotosus*, can inflict very serious envenomed wounds with the enlarged and serrated ossified-rays of the dorsal and pectoral fins. With the sting-rays the venomous weapon of offence is the great serrated spine (representing a dorsal fin) of the whip-like tail. The author states that a valuable racehorse, which some Kelantan Malays had stabbed with spines taken from a sting-ray, nearly died from the effects of the wounds. Of other marine animals the one most commonly used by Malays is the sea-worm *Chloeia*, the setae of which are irritant.

Chapter III is an interesting medley of other animal products to which the Malays attribute either toxic or therapeutic properties. A good many of them—such as the gall of the many animals specified, the powdered bones of goose, the knee-cap of tiger, the horns of serow and sámbar, the various land-snails, etc.—are like the ingredients of the charm of powerful trouble brewed by the witches in Macbeth. A few, like the Cantharid beetles and urticating hairs of caterpillars, are undoubtedly efficacious.

Chapters IV and V, which relate to vegetable poisons, naturally occupy a large part of the book. The numerous drugs are severally described under their vernacular names, the Linnean name and the reference to the appropriate Natural Order also being given; and the part of the plant used, along with the qualities assigned to it in local estimation, the manner

of its preparation and employment, and the symptoms and effects caused, are all duly considered. These chapters contain much curious information of a discursive sort illustrating manners, customs, criminal propensities, and popular beliefs.

The sixth and last chapter deals with inorganic poisons and their ingenious methods of administration with criminal intent. Powerful poisons like potassium cyanide and arsenic seem to be as easily procurable in the Malay States as they are in other Oriental bazárs.

Three appendices contain, respectively, some Malay charms and spells in romanized vernacular, a classification of poisonous Malay plants by Natural Orders, and a pharmacological list of Kelantan poisons.

The author is to be felicitated equally upon his practical curiosity and industry, and upon his liberal and philosophic outlook; it is not given to every medical man to be able to treat the contraptions and superstitions of the witch-doctor as human tissue worthy of attentive dissection.

A. Alcock.

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